

REMARKS/ARGUMENTS

Reconsideration of this application in light of the above amendments and following comments is courteously solicited.

Initially the undersigned would like to thank Examiner Lee for the courtesies extended during an oral hearing held with the undersigned at the U.S. Patent and Trademark Office on November 3, 2005.

With regard to the claim objections raised by the examiner on Page 3 paragraph No. 5 of his office action, Applicants by the instant amendment have amended claims 1, 3, 5, 6, 7, 8, 9, 10 and 19. It is submitted that these amendments have rendered the examiner's objections moot.

With regard to the prior art rejections set forth by the examiner in paragraphs 8, 9, 10 and 11 of the office action dated June 14, 2005, Applicants respectfully request the examiner to reconsider these rejections in light of the amendments to independent claims 1, 3 and 19 and the following comments.

Independent claims 1, 3 and 19 have been amended so as to distinguish over the cited prior art references, particularly, the teachings of the cited article to Romero et al. Independent claims 3 and 19 now set forth the following:

"...the two electrodes are formed at respective end

portions of the quantum dot layer, wherein the electron-flow through the quantum dot layer is blocked by the quantum dots formed in the quantum dots layer...".

In addition, independent claim 1 sets forth the following:

"...wherein the electron-flow through the quantum dot layer is blocked by the quantum dots formed in the quantum dots layer...".

The recitations included in independent claims 1, 3 and 19 emphasizes, that in accordance with the present invention, a quantum dot is a type of defect and that flow of electrons are obstructed by a mechanism such as scattering in the semiconductor with lots of defects, i.e. quantum dots. Therefore, the currents of electrons which flow through quantum dot are less than that of electrons which do not flow through quantum dots. In particular, since the electron moves laterally for quantum dot layer, the number of the effective quantum dots increases in the proportion of the distance between two electrodes and then this kind of effect is remarkable.

The foregoing is one of the differences from the Romero et al. reference. While in Romero et al. the device reacts upon incident light to detect the light, by using transition of electron from valance band to conduction band, the present invention employs transition of electrons in subband formed in conduction band, namely the quantum dot layer.

Also, the present invention is similar to the Romero et al. reference in that the electrons transmitted by light are moved to

channel and then currents are generated. However, the characteristics of the present invention will lie in that quantum dot is used as absorption part of light and only electron transit occurs from quantum dots which are electronically neutral. Transition of only electron occurs from quantum dots which makes the quantum dots inclined to be electronically positive. Accordingly, more electrons are drawn from the external source and these electrons are provided from terminals of drain and source. These technical features are not shown in the structure employing band to band transition.

Thus, the HEMT mechanism of Romero et al. differs from that of the present invention. The charge neutrality reestablishment by electrons drawn from an external circuit in HEMT mechanism would correspond to quantum dots refilled as many other carriers as the carriers released from the quantum dots by reason of absorbing incident lights. According to the present invention carriers in the contact layer are additionally drawn and accumulated in the channels until the quantum dots are electrically neutral. The number of carriers accumulated in the channels is larger than that of carriers excited and released from the quantum dots owing to additional drawing of carriers from contact layer, and accordingly the photo detect device of the present invention can detect extremely small quantity of incident light.

Accordingly, in accordance with the present invention the election-flow through the quantum dot layer is blocked by the quantum dots formed in the quantum dot layer. This is totally different from the teachings of the HEMT mechanism of Romero et al.

In light of the foregoing, it is submitted that all of the claims as presently pending patentably define over the art of record, comply with the formal requirements of 35 U.S.C. 112, first and second paragraphs, and are in condition for allowance.

An earnest and thorough attempt has been made by the undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

It is submitted that the claims as amended herein patentably define over the art relied on by the Examiner and early allowance of same is courteously solicited.

If any fees are required in connection with this case, it
is respectfully requested that they be charged to Deposit
Account No. 02-0184.

Respectfully submitted,

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I, Rachel Piscitelli, hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:
"Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on December 12, 2005.

